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VOLUME I NUMBER 2

AGRICULTURAL HISTORY

JULY
1927

ISSUED QUARTERLY

PUBLISHED BY
THE AGRICULTURAL HISTORY SOCIETY
CHICAGO, ILL.

Made in United States of America

AGRICULTURAL HISTORY

VOLUME I JULY, 1927 NUMBER 2

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Published by the Agricultural History Society. Annual Membership Dues $2.00 per year. Secretary-Treasurer, H. A. Kellar, 679 Rush Street, Chicago, Ill. Editor, O. C. Stine, Bureau of Agricultural Economics, United States Department of Agriculture, Washington, D. C.

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Three volumes of Agricultural History Papers have been published by the Society with the assistance of the American Historical Association as part of the Annual Report of that Association, and distributed separately by the Society.

AGRICULTURAL HISTORY is being issued only twice in 1927, as of January and July this year. Plans are being made for quarterly issues next year.

AGRICULTURAL HISTORY

VOLUME I JULY, 1927 NUMBER 2

SOME HISTORICAL RELATIONS OF AGRICULTURE IN THE WEST INDIES TO THAT OF THE UNITED STATES[1]

BY DR. C. A. BROWNE

Chief, Bureau of Chemistry, United States Department of Agriculture

I have been somewhat at a loss, this evening, for a subject upon which to speak to this association, the members of which are interested in the economics and history of agriculture. Economics has been called by some the gloomy science, for the reason, I suppose, that so many economic experts from Malthus down to the present have predicted the direful consequences which would take place as a result of over-population or from too rigid an adherence to a policy of free trade or protection. The professor of political economy, at Williams College, under whom I studied 35 years ago, Dr. A. L. Perry, was a leading exponent of the free trade doctrine. He attempted to prove to us that economics was just as exact a science as chemistry or physics but his arguments were so unconvincing that it was a common joke that the classes of students which went under him as free traders frequently came out as protectionists. "Old Peri," as we affectionately called him, was, I believe, satisfied in one respect at least with this result, for if he made few converts to his doctrine he at least stimulated students to think things out for themselves. The human factors which enter into our social problems are so various and complex that we cannot prophesy with the same degree of certainty in economics that is possible

[1] Read at the Ninth Annual Meeting of the Agricultural History Society, Washington, D. C., June 5, 1925.

with a mathematical science such as astronomy where eclipses can be foretold with absolute precision thousands of years in advance. This uncertain human element, however, imparts to economics and history a social value and interest which the mathematical and physical sciences can never give and this, it seems to me, is one leading motive for our taking up studies of this class.

Some of you may remember the title of a novel, by the famous Spanish author Ibañez, called "Mare Nostrum" or "Our Sea," by which he meant the great Mediterranean Sea which played such a part in the historical development of the civilizations of Egypt, Phoenicia, Judea, Carthage, Greece, Rome, Italy, Morocco, France and Spain. I wish that some American historian might select some such title as "Mare Nostrum" for a book giving the historical development of Western Civilization which has taken place about our own sea, by which I mean the great inland ocean between North and South America, that is destined to play so great a part, with the opening of the Panama Canal, in the future of this hemisphere. Around this sea great national contests have taken place for supremacy between aboriginal races in pre-Columbian times, between the aboriginal races and the early European settlers, immediately after the discovery, and then finally between the European races themselves. There are attached to this body of water tales of discovery, exploration, bucaneering and conquest to enliven the pages of such a history, which, if ever fully written, would have to be extended to many volumes. Much of this history, like that of the other sea, the Mediterranean, would have to deal with agriculture as practiced by aboriginal tribes and as developed by the conquering nations who came afterwards. It is about the agricultural history of the islands and countries in this Carribean region (in which I happened to become interested as a result of various trips that were made there during my connection with the cane sugar industry) that I wish to say a few words to you this evening.

The Spaniards were the first European nation to explore the region bordering upon the Carribean Sea and it is to them that we owe our first knowledge of the agricultural pursuits of the aboriginal races. Indian corn, cassava, tobacco, cacao, pine-

apples, vanilla, rubber, cochineal, jalap and many other agricultural products were found by the Spanish discoverers to be in use as foods, beverages, medicines, flavoring materials, dyestuffs, etc., among the native tribes who inhabited the Tropics of America. The world is still indebted to these aboriginal races, not only for its knowledge of these products but for the methods of preparing them for use.

The most common food of vegetable origin among the aboriginal tribes who dwelt around the Carribean Sea was tapioca or cassava meal. This substance, which is prepared from the root of the manioc or cassava plant, has from time immemorial constituted one of the principal foods for man in the American equatorial regions. Owing, however, to the hydrolysis of a poisonous glucoside the manioc roots in their natural state contain from 0.02 to 0.03 per cent of hydrocyanic acid which renders them dangerous for eating. The ancient aboriginal method of removing this harmful constituent consisted in first rubbing the decorticated roots upon graters made by driving numerous sharp pointed fragments of flint into slabs of wood. The grated pulp was then squeezed in a basket press in order to remove the poisonous juice. The starchy residue was then spread in a thin layer upon a heated griddle of stone or pottery where it was kept in frequent motion until dry. The cassava meal was thus completely deprived of its soluble volatile poison and could then be used as food. For preparing a finer quality of meal the grated pulp was washed with water through a fine sieve and allowed to settle in a basin. The sediment of starch was then freed from the excess of water by pressing or squeezing in a basket press and dried as previously described. Remains of cassava graters and griddles occur in abundance on the sites of ancient Indian villages in the tropics and show the wide extent of this primitive chemical industry among the American aborigines.

The Seminole Indians of Florida employed the starchy roots of a plant called *coonti*, which were pounded up and used for manufacturing flour. The apparatus employed for this purpose consisted of mortars, pestles, strainers and settling vessels. The starchy matter after washing from the pounded roots was puri-

fied by settling and straining. The wet mass was then allowed to ferment slightly after which it was dried upon palmetto leaves and then baked into bread. Coonti flour found considerable demand among the early white settlers of the South and mills were established for its manufacture.

The greatest food luxury which the world owes to the American aborigines is chocolate. The preparation of this beverage from the seeds of the cacao fruit reached its highest point of development among the more highly advanced tribes of Mexico. The process which they employed consisted in first roasting the dried beans over a gentle fire, after which they were crushed in a mortar into small pieces and the shells removed. The clean fragments of the kernels were then ground, while still warm, into a paste by means of a stone roller upon a flat mortar or metate, with the addition of vanilla, spices and other flavoring substances. The paste was then moulded into tablets and allowed to harden. For drinking, one, or more, of the tablets was beaten up in a cup of hot water by means of special stirrers or molinets, with the addition of honey or maize sugar for sweetening. The modern chocolate manufacturer follows essentially the same steps of the process as they were first learned from the Indians.

Without speaking further of the early agricultural pursuits of the tribes which dwelt about the Carribean Sea, it will be of interest to touch upon certain crops which were introduced into this region by the early European explorers. The first of these and the one destined to rank foremost in importance of all agricultural plants, either of foreign or domestic origin, was the sugar cane, which it may be said has played a greater part, historically, socially and economically, in the commercial development of Tropical America than any other crop. The sugar cane, in the extension of its culture by conquering nations about the Carribean Sea, underwent a development very similar to that which took place about the Mediterranean Sea several centuries before.

It was the Arabs who first introduced the sugar cane to the nations of Europe. The sympathy of Arabian Caliphs with agriculture, the sciences, and the useful arts, was one great means

of preserving the civilization of the ancient East and transmitting it to Europe. The Mohammedans, in their conquests of Persia and India, came early in contact with the sugar cane and transplanted it to the conquered nations of the West. Improvements in cultivation and irrigation were introduced, and the familiarity of Arabian alchemists and physicians with the process of recrystallizing salts led them, no doubt, to apply the same principle in refining sugar. In the books of the great Arabian scientist Avicenna, who lived about the year 1000, we find sugar described as we now know it, and from this time onward the use of sugar was destined to increase, until from one of the rarest and most expensive articles of luxury it became one of the cheapest and most abundant commodities.

From the valley of the Tigris and Euphrates the Arabs carried the sugar into Egypt and Palestine and, with the extension of their conquests westward, transported its culture to Asia Minor, northern Africa, to the Mediterranean islands of Cyprus, Rhodes, Crete, Malta, and Sicily, and finally to the continent of Europe itself, where it was widely cultivated in southern Spain, where its culture survives to the present day.

One great factor which favored the introduction of sugar to Europe was the Crusades. Readers of Joinville's chronicle will remember how the crusaders found the sugar cane growing in Palestine and, like the soldiers of Alexander 1500 years before, brought back stories of the wonderful reed whose sweet juice invigorated them after weary conflict or march. One of the chief benefits of the Crusades was the expansion which followed in the commerce between Asia and Europe, the chief city for the importation of Eastern commodities being Venice. The Venetians improved the art of refining sugar, which they learned from the Arabs, and during all of the fourteenth and fifteenth centuries held a monopoly for supplying Europe with sugar.

With the increase in consumption of sugar, the areas for the cultivation of the sugar cane widened. In 1420 the Portuguese transplanted the cane from Sicily to Madiera, and shortly after this time it began to be cultivated in the Canaries, Azores, and other western islands.

Immediately after the discovery of America followed the transplanting of sugar cane to the Western Hemisphere. Columbus on his second voyage, in 1493, carried with him sugar cane from the Canaries to San Domingo. The cane thrived so well in its new surroundings that the sugar industry spread rapidly to Cuba, Mexico, Brazil, and other provinces of the New World.

The sugar cane was first introduced into Louisiana in 1751. A vessel carrying soldiers to this French colony stopped at San Domingo in the West Indies and the Jesuits on this island asked for permission to send to the members of their brotherhood in Louisiana, a quantity of sugar cane to see whether it could be cultivated on the banks of the Mississippi. Upon the arrival of the ship this cane was set out on the plantation of the Jesuits above New Orleans and in this way the crop was introduced which was to play so great a part in the agricultural development of Louisiana. It was not, however, until 1794 that after various mishaps and failures the first successful crop of sugar was produced in Louisiana by Étienne de Boré on a plantation which a century later became the site of Audubon Park where the recent sugar experiment station was very appropriately located.

There is not time to sketch historically the respective parts played by the Spanish, English, French, Dutch, Portuguese and Danish in the extension of the sugar cane about the Carribean Sea nor to sketch the effect which the spread of this crop had upon the growth of African slavery. The latter institution was in fact so closely connected with sugar cane culture that for nearly three centuries one topic could not be written about, without also a discussion of the other. The very interesting antisaccharite movement of the eighteenth century for the abolition of slavery was based upon this connection, the abstention from the use of sugar being advocated as a means of breaking up the slave trade. "A family that uses 5 pounds of sugar per week, will by abstaining from the consumption 21 months, prevent the slavery or murder of one fellow creature." So runs the argument in an old antisaccharite tract widely circulated in England and the United States. It is impossible to follow intelligently the history of slavery in the United States without considering the influ-

ences which resulted from agricultural conditions in the West Indies.

The same is also true of the history of the movement which resulted in the independence of the United States. One of the earliest protests against exploitation of the English colonies by the Mother Country is found in an old tract of the year 1689, entitled "the Groans of the Plantations" which gives an account of the hardships endured by the sugar planters of Barbados one hundred years before the Declaration of Independence. It will also be remembered how large a part the various sugar and molasses acts, which were passed by Parliament, had in promoting the dissatisfactions that led to the eventual separation of the American Colonies from Great Britain.

The influence of West Indian agriculture upon that of the United States has been often overlooked. This influence was not only very great in the case of sugar cane culture but it was equally pronounced with other crops. It is not generally known that the cultivation of indigo was at one time a leading agricultural industry of some of the Southern States. The introduction of indigo culture into the colony of Carolina was due to the initiative of a young woman, Miss Eliza Lucas, whose father, Geo. Lucas, when Governor of the Island of Antigua in the West Indies, sent his daughter tropical seeds and fruits for trying out on his plantation at Wappoo near the city of Charleston. Among these was some indigo seed and the experiments which Miss Lucas carried out with this crop in 1742 were so successful that the production of indigo became in a few years one of the principal industries of Carolina, the amount exported just before the Revolution exceeding 1,000,000 pounds per year. The story of the early indigo industry of the South is well told by Dr. David Ramsay in his history of South Carolina. The cultivation of indigo in the Southern States was gradually supplanted by that of cotton, which is another United States crop of West Indian origin. Cotton began to be cultivated as a minor crop in the British West Indies long before the year 1700. At the opening of the eighteenth century these islands supplied about 70 per cent of the cotton used by Great Britain, but the greater profits obtained

from sugar caused the industry to be abandoned except in the small island of Carriacou in the Grenadines. The cultivation of cotton as a staple crop in the present territory of the United States did not begin until about 1770, the seed for this purpose, of the variety known botanically as *Gossypium barbadense*, being obtained from the West Indies of which it is usually regarded as the native. This species, the most valuable of all cottons from the length of its seed-hairs, thrived especially well in the Sea Islands and coastal region of the South East and hence acquired the later commercial name of Sea Island cotton. The quantity of cotton exported from the United States in 1792 was only 138,328 pounds which was all of the Sea Island variety. After the invention of the cotton gin, in 1795, the exports of cotton underwent an enormous increase, this invention making possible the utilization of the Upland Cotton of shorter staple, the species known as *Gossypium hirsutum*, which is of Mexican origin. When the Sea Island cotton was first introduced into the United States from the West Indies, it was a perennial plant, unsuited to the short season that prevailed in its new home. By a careful selection of seed from early-maturing plants this difficulty, however, has been entirely overcome. It is interesting to know that with the recent revival of the cotton industry in the West Indies improved American "Sea Island" seed was introduced back again to the original home of the species. Wonderful samples of cotton grown in Barbados from this seed were exhibited to me in 1919 by Mr. Bovell, the Director of Agriculture in that island, who expressed the opinion that the restoration of the Sea Island cotton to its original home had already produced a cotton surpassing in quality anything that had been grown in the United States. The history of Sea Island cotton, to a greater degree than that of sugar or indigo, furnishes an instructive study of the mutual agricultural relationships which have prevailed between the West Indies and the United States.

Next to sugar cane the most important crop which Europeans introduced into the West Indies was coffee. The Dutch were the first to plant coffee in the Western Hemisphere, this event taking place at their colony of Surinam in 1718. Two years

later, however, the French introduced coffee cultivation into Martinique from which island the new crop spread quickly to all the islands and regions surrounding the Carribean Sea. This rapid extension in the cultivation was due partly to the rapid increase in the use of coffee in the English colonies of North America. The difference between the English speaking peoples of North America and of Great Britain in this respect is shown by the fact that the annual per capita consumption of coffee in the United States at present exceeds 12 pounds while in Englnd it is only about 1 pound.

Some very amusing stories are told about the early introduction of coffee among our colonial ancestors. I quote the following episode from Chase's "History of Haverhill, Massachusetts."

"About the year 1757 a party of gentlemen arrived from Boston and put up at Lt. Ebenezer Eastman's tavern. They brought their coffee with them and requested the landlady to cook it. The good lady, not being particularly acquainted with the article, nor the manner of cooking it, hardly knew what to do. But, having a little self-confidence, with her other good qualities, she scorned to ask advice and proceeded to cook it in her best manner. Accordingly she took her bean pot, put the coffee into it, filled it with water and boiled it as she would beans. At length the refreshment was ready and when the gentlemen sat down, they were not a little surprised to see their coffee set before them, well boiled, in the kernel. They, however, took it very good naturedly and afterward instructed her in the mystery of cooking coffee."

It would be interesting to trace the history in the West Indies of the cocoanut, the pineapple, the banana, the lime and the many other plants which have contributed to the agricultural wealth of this region. This phase of our subject must, however, be passed over in order to say just a word about an epoch-making development which took place in Barbados a generation ago and which has revolutionized the agriculture of the sugar cane not only in the United States but in all parts of the tropical and subtropical world. I allude to the discovery of sugar cane seedlings.

It is a strange fact that the seed of the sugar cane, one of the oldest known plants, should have been generally regarded as sterile until only about forty years ago. Sugar cane seedlings seem to have been first discovered in Barbados in 1858 by Mr. Parris, a local sugar planter, who wrote an account of his obser-

vations for the local press. While the discovery was contradicted and not immediately followed up there was nevertheless a tradition established that the seed of the sugar cane might under certain conditions germinate. Among those who were influenced by the work of Parris was J. R. Bovell, the present retiring Director of Agriculture in Barbados, who in 1888 discovered in a sugar cane field a number of self-sown seedlings. The actuality of the germination of cane seed, when the rediscovery was announced, was again disputed and it was not until Prof. J. B. Harrison and Mr. Bovell demonstrated the fertility of cane seed by actual germination tests in 1889 that all doubts upon the subject were removed. This discovery came at a most opportune time for just after this date the old Bourbon cane, which for centuries had been the chief source of the world's sugar supply, began to decline in vigor and to succumb to the attack of fungus diseases. The yields of cane fell off enormously and the sugar industry of the West India Islands would have been ruined, had the new hardier seedlings, which had been developed, not come to the rescue. The seedling cane, D 74, which revolutionized the agriculture of the sugar cane in Louisiana and added millions to the wealth of that state, is supposed to have originated in Barbados. The seedling canes not only give greater yields of sugar per acre but they offer means of producing plants that have greater resistance to freezing and to various diseases such as the mosaic.

The future agricultural developments which are to follow from the scientific work of Harrison, Bovell, Watts and other scientists in the West Indies and from the recent establishment of the Agricultural College in Trinidad will unquestionably be far-reaching and the mutual relationship between such work and that of our own scientists is bound to be closer as the years go by.

Those of you who may care to study the history of agriculture in the tropical regions of America will find a most interesting collection of literature upon the subject, beginning with the accounts of early discovery and conquest written in the sixteenth century and coming down to our own time. There are histories of each of the islands and countries around the Carribean written by explorers, missionaries and colonial Governors. There are

also innumerable travel books, such as those of von Humboldt, which are filled with a wealth of agricultural information. More recently the early history of some of these regions is being rewritten by specialists who are going over one by one the early colonial documents deposited in the archives of different European capitals. Miss I. A. Wright has cleared up many obscure points about the early agriculture of Cuba and of the other Spanish islands by her investigation of documents in the Archives at Seville. Prof. Westergaard has done the same in his "History of the Danish West Indies" from old colonial documents at Copenhagen. Investigations which are based upon original documents are the most trustworthy and this is as true of agriculture as of any other branch of historical research.

EGYPTIAN AGRICULTURAL LABOR UNDER PTOLEMY PHILADELPHUS

By William Linn Westermann

Columbia University

Throughout four thousand years of the recorded history of Egypt two factors may be regarded as combining to determine the course of the history of the state which is made by the Nile. Both of these factors are geographic. The first is that Egypt has always been preeminently an agricultural land, highly productive because of the Nile flood, and under the normal conditions of a sound administration, productive of a surplus for export of whatever crops may be emphasized. Throughout antiquity food stuffs, particularly wheat and barley, were the two great agricultural staples. The change from these crops to sugar cane and cotton planting as the two outstanding crops of the valley is quite modern, a late result of the Industrial Revolution. The second factor is that Egypt, under any effective and strong government, has always tended to be a center of trade for the three abutting continents of Africa, Asia and Europe. Up to the introduction of steam transportation the Nile was a great carrier of goods as well as their producer. By water transport and riparian caravan route it tapped the resources of central Africa and poured these out at its mouth into the sea lanes of Mediterranean commerce. The Red Sea connected Egypt with Arabia, the east African coast the southern shore of the Iranian plateau, and India. The Mediterranean outlet of the Nile opened up to its mercantile fleet the entire north African coast and the southern coast of Europe as important and accessible areas of export. This second element, as an historic determinative, was more important in the ancient and medieval periods of Mediterranean history than in modern times. As the agricultural factor has played a prominent part in determining the his-

tory of Egypt, conversely the history of Egypt offers a field for the study of agricultural history which in one respect is not to be duplicated. Nowhere else except in Egypt does the world offer a continuous history of agricultural production and organization of five thousand years duration.

The interest of scholars working in the history of antiquity has followed a natural course in its treatment of the large masses of new archaeological and written evidence upon Egyptian history which have appeared in the past century. Political history and administrative organization have necessarily commanded their attention first of all. In these fields of attention the results obtained have been subject to constant readjustment, demanding new monographic treatment and new books as new data appeared. It is only in the past five years that comprehensive studies have been undertaken of the agricultural production and the methods used in the ancient periods of Egyptian history. A thorough general study of ancient oriental, or pre-Hellenic, agriculture has recently been published by a young Frenchman.[1] A monograph especially devoted to viticulture and brewing in the ancient Orient, appeared a year earlier.[2]

A large percentage of the thousands of the Greek papyri which have been published in the past thirty-five years deal, either directly or indirectly, with agricultural life in Egypt in the period of the Macedonian and the Roman rule. About a decade ago I began a series of special researches in agriculture based upon this material[3] while similar articles were appearing in various journals in Europe.[4] These studies have now been outstripped by, or incorporated in, a splendid book on Egyptian agriculture by

[1] Fernande Hartman, *L'agriculture dans l'ancienne Egypte*, Paris, 1923.

[2] H. F. Lutz. *Viticulture and Brewing in the Ancient Orient*, Leipzig, 1922. See the criticism of Lutz's monograph by T. Eric Peet in *Annals of Archaeology and Anthropology* (Liverpool), X 52–4. According to Peet's review the writer's philological equipment was not entirely adequate to the task which he took in hand. R. Billiard's *La Vigne dans l'Antiquité*, Lyon 1913, must also be mentioned and a recent article by Ch. Dubois, L'Olivier et l'Huile dans l'ancienne Egypte, in *Revue de Philologie* XIX (1925) PP. 60–83.

[3] See various articles in *Classical Philology*, vol. XII, XIV, XVI, XVII.

[4] Two important papers upon the irrigation system were published by Aristide Calderini in *Aegyptus* I.

Michel Schnebel, covering the period 300 B.C. to 700 A.D.[5] Only the first volume has so far appeared, dealing with the irrigation system, types of crops, seed, planting, fertilizing, harvesting and cattle raising. It is a technical study of a high order, written by a man who has had practical farm experience. With this essential foundation Schnebel has combined an admirable industry and carefulness in sifting, organizing and, interpreting thousands of small data. These details he has re-constructed into a book which will, no doubt be fundamental in its field for several decades to come. This new interest in agricultural history in antiquity is not confined to the eastern Mediterranean lands. A useful study has just appeared upon the agricultural production of the Roman state in the period of the republic before its overseas expansion. One of its conclusions is that the cultivated soil of Italy was largely given over to wheat production until the period of the Hannibalic War.[6]

Out of this new and important field of interest I wish to present to you a small detail. As far as possible my remarks will be limited chronologically to a space of twenty-three years of the third century of the pre-christian era (260–238 B.C.). Its point of attention will also be restricted, namely, to the laborers whose manual toil produced and handled the agricultural wealth of the Egyptian state, and to the relation of this laboring class to the higher human stratum of Greeks and Macedonians who dominated them. This upper stratum furnished the directing and exploiting brains and energy and controlled the capital required by those who were the agents of a state policy of economic determinism and control.[7] It is unquestionably a study in ex-

[5] M. Schnebel, Die Landwirtschaft im Hellenistischen Ägypten, *Münchener Beiträge zur Papyrusforschung, Siebentes Heft*, Munich, 1925.

[6] R. Scalais, La Production Agricole dans l'Etat Romain, in *Le Musée Belge* XXIX (1925), PP. 143–63.

[7] W. L. Westermann, The Greek Exploitation of Egypt, in *Political Science Quarterly* XI (1925) 527–39, with references to some of the recent studies in this field. Particular attention must be called to two fundamental articles: Ulrich Wilcken's, Alexander der Grosse und die hellenistische Wirtschaft in *Schmoller's Jahrb. fur Gesetzgebung* XLV 45, ff. and Michael Rostovtzeff's Foundations of Social and Economic Life in Egypt in Hellenistic Times in the *Journal of Egyptian Archaeology* (J. E. A.) VI 161–78.

ploiting capital and exploited labor; but the degree of the pressure which the exploiting class could bring to bear was determined, as is always the case by many conditions. Some of these were general and continuous in their application. Others were local and immediate, only, in their effects.

The source of our information is the papyri which have been found in Egypt during the past forty-five years. For the thirty-six years from 274 to 238 B.C., when Egypt was under the rule of two skillful administrators, the Ptolemies called Philadelphus and Euergetes, we have information which is particularly important and rich in detail. In addition to official documents such as the Petrie Papyri and a large section of the Laws Regulating Internal Revenue passed by Ptolemy Philadelphus, there has been published in the past nine years one large and coherent group of papyri written in Greek. It is made up of the semi-official and semi-private papers which formed the business files of a Carian Greek named Zenon who lived for twenty years in the Fayum in Egypt. Already about 465 of these papers, many in an excellent state of preservation, others mere fragments, have been transcribed and published. I judge that about 700 documents still remain unpublished, which are in the hands of scholars who will soon edit them. The importance of the finds is heightened by the fact that Zenon managed for nine years a big estate granted by King Ptolemy to Apollonius, who was the Dioecetes or Treasurer of State of Egypt during the last fourteen years of the reign of Philadelphus. For the general discussion of the estate management, the administrative problems and the mass of new information which the Zenon papers lay before us on the agricultural life of the time I must refer you to the fascinating study published by Professor Michael Rostovtzeff in 1922.[8]

The Egyptians as a people looked back upon a past which could boast centuries of political power and cultural splendor. Great monuments of that splendid past were present daily before the eyes of the most impoverished Egyptian peasant. The

[8] M. Rostovtzeff, *A Large Estate in Egypt in the 3rd Century B. C.*, Madison, Wisconsin, 1922.

strong priesthood of the state religion was thoroughly conscious of the great national tradition. For three hundred years before the conquest by Alexander the feeling existing between the Greek City States and Egypt had been most friendly. It was based upon mutual self-interest and mutual fear of and hostility to Persia.[9] The Egyptians came under the actual weight of the imposing Persian power. The Greek City States were chilled for more than a century beneath its shadow (546–400 B.C.)[10] The young Macedonian conqueror, Alexander, had appeared in 332 B.C. to the priesthood and people of Egypt as a liberator from two hundred years of oppressive rule under the satraps of the King of Kings. During the lifetime of Alexander his actions gave the conquered peoples many evidences of an intention to treat their upper class at least, most liberally in the final arrangements which were to be made for the rule of his distended empire.[11]

This long tradition of friendship and Alexander's liberal policy toward the upper-class indigenes must have been a tremendous help to the Macedonian noble Ptolemy, called the Savior, in the establishment of his firm hold upon Egypt and its population. What caused the reversal of this policy to the one which marked the Macedonian rule throughout its first century (322 B.C. to 196 B.C.) is a matter of conjecture. Probably it was necessity, in that the external political problems of the Ptolemies were entirely different from those which had faced Alexander. However this may be, the facts are clear. The Ptolemies continued the absolutistic political sway to which the Egyptians had been

[9] This tradition of political friendship began with the revolt of Psammetichus I from Assyrian rule and the establishment of the XXVI (Saite) dynasty in the seventh century B. C. See Ulrich Wilcken, *Griechische Geschichte*, Munich, 1924, p. 58. It remained unbroken throughout the period before Alexander.

[10] The limits thus chosen for the conscious fear of Persia among the Greeks are the conquest of Croesus of Lydia by Cyrus the Great and the Anabasis of the Ten Thousand Greek mercenaries under the younger Cyrus.

[11] For Egypt this liberal policy toward the native upper classes, is attested by the appointment by Alexander of two native Egyptians, Doloaspis and Petisis, as heads of the civil administration of the country beside a certain Cleomenes, a Greek, who was himself of a family resident in the privileged Greek city of Naucratis at the mouth of the Nile.

accustomed. They developed to the highest degree a policy of economic determinism on the part of the state, the power of the state being represented in the divine person of the ruler. The political and economic absolutism of the early Lagids were, both alike, based upon the use of foreign, non-Egyptian agents, particularly Greeks and Macedonians. The Ptolemaic armies were filled with Macedonian and Greek, in lesser degree Persian and Arab, mercenaries. These foreign soldiers maintained peace within Egypt and defended the policies of the state abroad. All but the lower administrative positions in a wide spread and over-manned official hierarchy were held by Macedonians and by Greeks who hailed from all quarters of the Greek world, though predominantly from the Eastern Mediterranean lands.[12] The official policy in filling all positions of prominence, except in the religious organization of the state, was one of suppression of the indigenous population.[13]

Economically the life of the country was almost completely dominated by the government. The state, in the person of the King, was the sole owner of the arable land. It held monopolistic control, complete or strongly dominant, in many lines of industry.[14] The Greeks predominated in the group of immigrants who came in as the agents of this policy of exploitation of the Egyptian people. They were, of course, rewarded for their services. A 10,000 arourae[15] land grant made to the Treasurer General, Apollonius, by King Ptolemy Philadelphus was probably extraordinary in size. But there were other similar grants of big estates in the Fayum.[16] which contained a large amount of

[12] In the *prosopographia* appended to Fritz Heichelheim's study of the foreign populations of the Ptolemaic kingdom (*Klio, 18tes Beiheft*, Leipzig, 1925, p. 84), one finds only 101 Macedonians for the early Ptolemaic period as against 614 Greeks. This finds its explanation in the prominence and prosperity of the Macedonian kingdom at that same time.

[13] See Pierre Jouguet, Les Lagides et les Indigenes Egyptiens, in *Revue Belge de Philologie et d'Histoire II* (1923) pp. 419–45.

[14] This situation has been admirably sketched by Rostovtzeff in J. E. A. VI (1920) pp. 161–78.

[15] An aroura was equivalent to about $\frac{2}{3}$ of an acre.

[16] Rostovtzeff, *Large Estate* pp. 42–7. I have never been able to agree with Rostovtzeff's statement (p. 47) that 10,000 arourae holders were very numerous in the nome (*scil.* the Arsonoitis). It is physically impossible.

reclaimed land. This land, reclaimed by a great irrigation project of Ptolemy Philadelphus, could be granted by the King without direct infringement upon the rights of the natives. But the amount of this new land could not possibly have supplied the needs of the greater and lesser administrative agents of the government and the foreign-soldier immigrants as well. For the Greek soldiers now received land holdings ranging from 100 to 25 arourae in extent. This represents an important change in tenure conditions in Egypt, a debasement in the position of the native population, even in comparison with the period of Persian rule. For when Herodotus travelled in Egypt in the fifth century before Christ the soldiers were native Egyptians each of whom was a holder of a twelve arourae plot.[17]

In a recent study one of the ablest among our papyrologists has strongly presented the theory that the commercial policy of the Ptolemies is to be compared with the mercantilistic policy of the European national states of the seventeenth and eighteenth centuries.[18] It is impossible, however, to prove that the Ptolemies consciously worked toward maintaining a favorable balance of trade in the precise form in which it was practised by the European national monarchs. This would imply that they favored exports and imported, as far as possible, only raw materials, which were to be manufactured for export sale, the ultimate end being to maintain a favorable money balance.[19] Lack of statistical material and of any written formulation of a mercantilist theory may make Wilcken's suggestion incapable of complete proof. Yet it is quite certain that many of the essentials of mercantilism were at hand. Among these may be singled out, for the purposes of this investigation, manufacture on a large scale, protection against foreign goods by high import tariffs, and the pressure at home of cheap labor which could be controlled readily by the state.

[17] Pierre Jouguet *op. cit.* p. 332, taken from Herodotus II 168.

[18] Ulrich Wilcken, Alexander der Grosse in Schmoller's *Jahrb. für Gesetzgebung* 45 (1921), p. 45 ff.

[19] This essential weakness in his theory of the *paleo-mercantilism* of the Lagid Kings has been brought out by Wilcken himself in his new *Griechische Geschichte*, p. 212.

If the attitude of the Ptolemaic government of the third century was one of non-acceptance of the Egyptians in the military organization and in the higher branches of the civil service, the indigenes were obviously, by virtue of that attitude, debarred from becoming holders of the revocable grants of land which were the rewards of these services. If the state monopolized many of the essential fields of manufacture, as it did, the native peasants were equally debarred from engaging in private industry in these fields. Their opportunities of earning a living must then have been confined to the following services: to the lower forms of the administrative hierarachy; to the business of transportation; to skilled industries, whether independently conducted or in the state factories; as day laborers; and, most of all, as direct tenants of the farm land of the King or as sublessees of the Greek and other foreign agents of the government who held land grants from the King. It is, indeed, in such services that we find the Egyptians, in great numbers, appearing in the Zenon correspondence. This lower sphere of activity in the economic and social life of the Egyptian state was wide enough. But the horizontal limitation upon the rise of the natives to the more lucrative and more powerful positions in the industrial and civil life of their own land, must have been felt as a heavy injustice. This feeling does not appear, in conscious formulation, in our papyri of the third pre-Christian century. It does appear, however, in the political situation at the close of the third century and throughout the second century, in revolts and civil wars which were partially nationalistic-Egyptian in character. In 163 and 161 B.C. a Macedonian, named Ptolemaeus, who was living the life of a religious recluse in the Serapeum at Memphis, entered complaints for assault upon his person "because he was a Greek." The attacks upon him and another Greek were made by servants of the temple, a baker, a doctor, some cleaners and the like, all of whom have Egyptian names.[20] This must have been a typical incident, representing many similar occurrences of the time. The civil wars, the nationalistic opposition of the priesthood, and

[20] See the texts and discussion in Ulrich Wilcken, *Urkunden der Ptolemäerzeit*, (Berlin 1922), I, nos. 7–8.

the feeling of the people, eventually wrought a change in the attitude of the "Ptolemaic dynasty" toward the indigenes. Unfortunately these revolts did not serve to change the economic machinery of the state in its fundamental forms.

An interesting and a safe approach to the question of the wages of agricultural labor in the third century B.C. has recently been granted us.[21] From a number of documents of the Zenon group it is apparent that the problem of transportation of the agricultural products from the large holdings of Apollonius to the central markets at Memphis and Alexandria was a difficult one to solve. The difficulty lay in the seasonal character of the work. The season of transportation would be the summer and early fall months, the period of full canals, after the crops were in and threshed and the taxes paid to the government officials. Apollonius was forced to buy boats and equip them with captians and crews to whom he paid wages by the month. Lest this investment lie idle and unproductive he was urgent that Zenon should let out the boats, with their crews, to other people, when not needed in his own service, preferably to those who would pay the crews during the period of renting the boat.[22] In pursuance of this sound business policy Zenon once received an offer for the rent of a boat which belonged either to himself or to Apollonius. At the head of this offer the bidder put the total wage cost of running the boat for a year at 390 drachmas and the tax to the king at 290½ drachmas.[23] The sailors' wages are given at 7½ drachmas per month each, with 10 drachmas for the captain. The first of three offers made to Zenon reads as follows: "I will pay to each of the sailors as wages 6 drachmas and 1½ *artabae* of wheat (per month) and to the captain 8 drachmas and 1½

[21] In an undated memorandum addressed to Zenon, *Annales du Service des Antiquites de l'Egypte* XXIV pp. 51–2. The Zenon papyri published by C. C. Edgar in volumes XVIII-XXIV of this journal are customarily cited by the name of their able editor as P. Cair. Edgar. This one is P. Cair. Edgar 111.

[22] P. Cair. Edgar 19 of the year 29 (257/6 B. C.) Cf. P. Cair. Edgar 2 of 260 B. C.

[23] P. Cair. Edgar 111, 2–7. The 290½ drachmas was corrected to read 292½. The king's tax was about 42⅔ per cent of the total annual running expenses of the boat, not including repairs. Repairs, figured at the end of the document, were given at 26 drachmas, relatively a small item.

artabae of wheat, total for year 312 drachmas and 72 *artabae* wheat, that is, reckoned in silver, 680½ drachmas including (the) 72 *artabae* wheat."[24] Here we obtain a clear and definite wage, equated with the price of wheat at the same time. The wheat price was 1 drachma and 1⅓ drachmas per *artaba*. I am thoroughly conscious of the difficulties in the attempt to express in terms which will carry any meaning to us of today the relationship between this wheat price, the wage rate, and the standard of living of the period under discussion. The first difficulty is that we know of many different sizes of the *artaba* in the Ptolemaic period and that we cannot determine what particular *artaba* was used in a given case unless the fact is definitely stated.[25] A second difficulty lies in the impossibility of establishing the ratio of ancient wheat consumption to the per capita food consumption even in the same district for ancient and modern times. A third variable and indeterminable factor arises out of that group of material and psychological expectations from life which constitute what we call the "standard of living." Despite these difficulties the attempt must be made.

For the purposes of our investigation we may assume, with allowance for a 25 per cent margin of error either up or down, that the *artaba* was roughly equivalent to our bushel.[26] The general assumption in antiquity was that the wheat requirement to nourish each man for a year was from 300 to 400 liters,[27] or,

[24] The total of 680½ drachmas includes, of course, the king's tax on the boat. Also in the payment of kind to the captain a better grade of wheat was reckoned upon than that furnished to the ordinary sailors. Its price was reckoned in at 1⅓ drachmas per artaba as against a drachma per artaba for the sailors. This is lower on the whole, than Angelo Segre's figures for the third century B. C. which range from 1½ to 2⅛ drachmas per *artaba*. See his *Circolazione Monetaria* (Rome 1922) pp. 100–01. It is safer to follow the unequivocal testimony, for the time of Zenon, of P. Cairo Edgar 111.

[25] *Artabae* ranging from 24 to 40 *choinikes* are known. The *choinix* is generally regarded as roundly equivalent to our quart. An official artaba of 36 *choinikes* is known for the late 2d century B. C. See Ulrich Wilcken in Mitteis-Wilcken, *Grundzüge und Chrestomathie der Papyruskunde*, (Leipzig 1912), I, 1, p. LXVIII.

[26] I here assume that the *artaba* was one of 32 *choinikes* (about a bushel) taking the mean between the *artaba* of 40 and that of 24 *choinikes*.

[27] Eugene Cavaignac, Population et Capital dans la Monde Mediterranéen Antique, in *Publications de la Faculté des Lettres de l'Université de Strasbourg*,

roughly speaking, from 10 to 15 bushels. The common sailor of P. Cairo Edgar 111 was scheduled to earn 18 bushels of wheat per year plus 72 drachmas, or a total equivalent of 90 bushels of wheat per year. For a family consisting of himself, wife and one child, his wheat consumption would be about 36 bushels per year.[28] For all other requirements of the life of a family of three he should have available 54 drachmas, roughly the equivalent of 54 bushels of wheat. With all allowance for error in this complicated and difficult expression of his earnings, we may certainly conclude that a wage earner of the sailor class could earn but little beyond a bare existence for a small family. That would be true even if we grant that the wife had a certain earning capacity, either at weaving,[29] nursing, or for light work in the fields at harvest time.

A Zenon fragment at Hamburg published in 1924 discloses free laborers (*somata* in the Greek) working in couples, the one for $1\frac{1}{4}$ obols a day, the other at $\frac{1}{2}$ an obol.[30] The nature of the work does not appear on the preserved parts of the document; but presumably it was some form of agricultural labor. As I would interpret the divergence in the wage, this must have been a man assisted by a boy. Working with these two appear two slaves (*paidaria* in Greek) and occasionally an *ergates;* but against these latter entries daily payments are not posted.[31] A list of expendi-

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Fascicule 18, (Strasbourg 1923), p. 2. The classic presentation of the available figures from antiquity on this question is to be found in Karl Julius Beloch, *Die Bevölkerung der griechisch-römischen Welt*, 1886 p. 32 f.

[28] The average of 12 bushels a year per caput is taken from Beloch, *op. cit.*

[29] In P. S. I. (*Publicazioni della Societa Italiana, Papyri Greci e Latini*) VI 599 some weavers demand from a Zenon $1\frac{1}{2}$ obols a day for men, $\frac{1}{2}$ obol a day for a woman weaver, and $\frac{1}{3}$ of an obol for a servant, probably a "handy man" about the shop.

[30] There were six obols in the Greek drachma. The normal silver value of the drachma is generally reckoned to have been about eighteen cents; but its actual purchasing power at any given time is hard to ascertain. The eighteen cent standard for conversion into terms of our money is, of course, inapplicable for Zenon's time. The equation of 1 drachma = 1 bushel of wheat will show this sufficiently.

[31] *Griechische Papyrusurkunden der Hamburg Staats und Universitätsbibliothek* (P. Ham.) I no. 114. I have been unable to determine the distinction, which is clearly made in this document, between *somata* and *ergatai*.

tures made by a certain Polemarchus in the year 257–56 B.C. has been preserved[32] which gives us a comparative standard confirmatory of the wages paid to farm labor. This was the expense account of a government expedition, importing onions by ship and caravan into the Fayum. As against the dire picture usually drawn of the compulsion used against labor by the Ptolemaic government[33] it is well to point out that the government here had hired its labor in the labor market. This was done under two systems, partly by piece work, partly at so much per man for each day. Polemarchus contracted with a group of men for the entire job of loading the onions into the boat, at $3\frac{1}{2}$ drachmae per 100 *artabae*. He paid two agents called "attendants" of the expedition, at the rate of $1\frac{1}{2}$ obols per day. For unloading he paid 8 workmen (*ergatai*) at the rate of an obol a day. For "rubbing off" the onions, presumably cleaning them, he paid at the rate of $\frac{1}{2}$ an obol per day.

Other documents help us to establish the average rate of pay for farm labor and similar work at about 1 obol a day in the period of Zenon's activity.[34] This totals 5 drachmas per month which is the equivalent of 5 bushels of lower grade wheat, as against the $7\frac{1}{2}$ bushels (= drachmas) of the sailors in P. Cairo Edgar 111. Granting that the farm hands who earned an obol a day probably cultivated also small plots of their own as sublessees, the standard of living which they could maintain was obviously a low one. This conclusion is borne out by the lack of personally owned tools and draft animals on the part of the peasants with which to carry on their work. Zenon had to loan

[32] In P. S. I. IV 332. For proof that this was a government enterprise see Schnebel, *Landwirtschaft*, p. 209.

[33] For example Rostovtzeff in writing his survey of the economic and social foundations of life in Ptolemaic Egypt (J. E. A. VI 161–78) was giving an impressionistic general sketch based upon his recent work upon one of the Tebtunis documents, which still remains unpublished. My feeling is that the conditions of the time of Euergetes I, or later, as the case may be, do not apply so strongly to the period of Zenon. In Zenon's time in Egypt special conditions prevailed which I can only suggest in this brief paper. These conditions were favorable to a freer movement of labor.

[34] See Westermann and Laird, P. Wisconsin I in J. E. A. IX (1923) p. 90; and cf. Segré, *Circolazione Monetaria*, pp. 112–13.

money to his peasants for the purchase of donkeys to assist them in the harvest work.[35] In making its contracts for public works the government of Ptolemy Philadelphus sometimes agreed to furnish the tools which were needed to put the job through.[36] Lack of any direct ownership of arable land combined with the frequent want of the instruments of production on the side of labor, must be regarded as an ominous condition from the viewpoint of the independence of that labor.

The Ptolemaic state of the time of Zenon was a complete autocracy in its political activities. In the field of economics its control was potentially as complete.[37] Yet the Zenon correspondence gives us an impression of freedom of movement and self-determination on the part of lower class peasant labor which does not support the idea of the rigidity of the economic system which one draws from the laws upon the oil and wine monopolies.[38] The peasants had one protective measure to which they could, and often did, resort when hard pushed. They could strike, even the royal peasants who were under strict contractual agreements with the state[39] and more closely under its hand than other forms of agricultural labor. During the harvest season of 257–56 B.C. a group of crown peasants about Philadelphia were asked by Panacestor, an agent of Apollonius, to come to an agreement with him regarding the previsionary estimate of the crop for the following year. They refused to do this, alleging that they had an agreement with Apollonius that they would pay in a third of the crop, they themselves making the previsionary estimate on which the expectation of the government's income in kind for the succeeding year would be based. When Panacestor insisted, the crown peasants took sanctuary in a temple and would

[35] P. Cairo Edgar 36, cf. 49 *introd.*

[36] P. Cairo Edgar 41, note to line 7. In this particular document it is probable, though not certain, that the "hoes" spoken of belonged to the government.

[37] See Rostovtzeff in J. E. A. VI 165–66.

[38] In the *Revenue Laws of Ptolemy Philadelphus* published by B. P. Grenfell, 1896.

[39] P. S. I. V 502. See Friedrich von Woess, Das Asylwesen Agyptens in der Plolemäerzeit, *Münchener Beiträge zur Papyrusforschung und antiken Rechtsgeschichte*, 5 Heft, Munich, 1923.

not budge from the stand they had taken. They asserted that they would sooner abandon the sowing. Panacestor was forced to give in, much to the disgust apparently of Apollonius. The peasants were permitted to put in a counter-estimate of their own of the crop expectation of the next season.

It is my belief that the situation of the common Egyptian laborer in Zenon's day was more free from constraint than it was in the last three decades of the third and in the second pre-Christian century.[40] This favorable situation can readily be explained. The reign of Philadelphus was a period of rapid expansion and economic development, particularly in the Fayum. A great irrigation project was under way, all done by hand labor. Whole villages and towns were being built, with dwellings for men, temples of the gods, and public buildings. Labor could be, and was, imported from foreign parts. But the bulk of this labor must be furnished by native people. It was not all one sided. The Greeks who developed the resources of Egypt with new methods and northern vigor furnished the capital for all these works, either they or the government. There are numerous indications in the Zenon Papyri that the requisite money was not always at hand to pay salaries and wages or to complete some necessary enterprise.[41] This financial strain upon the Greek exploiters and their absolute need of the Egyptian labor combined to create the temporary situation which the Zenon correspondence presents. A pilot is in jail; and the order goes out that he be released "in order that the boat may not be idle."[42] Such orders for release of workmen from arrest appear fairly frequently in the Zenon letters and they are always based upon the statement that the man is needed at his particular work.

[40] As represented in the unpublished Tebtunis papyri which Rostovtzeff used in his article in J. E. A. VI, and in the second century documents which had appeared long before in *Tebtunis Papyri* vol. I.

[41] See the papyrus published by Collart and Jouguet Inv. 580, in Raccolta Lumbroso, *Aegyptus, Serie Scientifica* VIII in which a banker states that 1000 drachmas required for dike work was not on hand. In P. S. I. IV 421 some dike guards threaten to leave the job because they have not been paid. Cf. P. S. I IV 426.

[42] P. Collart-Jouguet Inv. 581 in *Raccolta Lumbroso.*

NOTES

The tenth annual business meeting of the Agricultural History Society will be at the Cosmos Club, Washington, D. C., on the evening of September 13th. Dinner will be followed by a business meeting and a short program. Dr. E. E. Dale, President of the Society, will read a paper entitled "Those Kansas Jayhawkers," a discussion of the conflict on the frontier between the ranger and the cultivator in Oklahoma and Kansas. Dr. B. T. Galloway of the Bureau of Plant Industry, Department of Agriculture, will read a paper entitled "History of Plant Pathology," an account of scientific research developments in this field.

A paper by Dr. L. C. Gray, in charge of the Division of Land Economics of the Bureau of Agricultural Economics, entitled "Market Surplus Problems of Colonial Tobacco," will be published in the January 1928 issue of AGRICULTURAL HISTORY. Miss Ellen Churchill Semple offers two articles on ancient Mediterranean agriculture, one for the April and the other for the July issue.

At the twentieth annual meeting of the Mississippi Valley Historical Association March 31 to April 2, 1927, several papers of agricultural interest were presented. Among these may be mentioned—"Routine on a Louisiana Sugar Plantation, Under the Slavery Regime" by Walter Prichard of Louisiana State University; "The Grain Trade of New Orleans, 1804–1814" by W. F. Galpin of Syracuse University; "Notes on General Robert E. Lee's Horse Supply, 1862–1864" by C. W. Ramsdell, University of Texas; "Economic Incidents of the Civil War in the South" by J. L. Sellers, University of Wisconsin; "Cleavage Between the Northern and Southern Farmers' Alliances," N. C. Nixon, Vanderbilt University; "The Mississippi Valley in 1816 Through an Englishman's Diary," Otto L. Schmidt, Chicago. At the annual meeting of the Illinois State Historical Society at

Springfield, Illinois, May 12–13, 1927, a paper on Agricultural Machinery as a Factor in the Development of Illinois Agriculture, 1835–1860, was read by Herbert A. Kellar of the McCormick Agricultural Library.

A. O. Craven, University of Illinois, is engaged in preparing a biography of Edmund Ruffin.

Russell Anderson of the University of Illinois is engaged in preparing a history of Illinois agriculture up to 1873.